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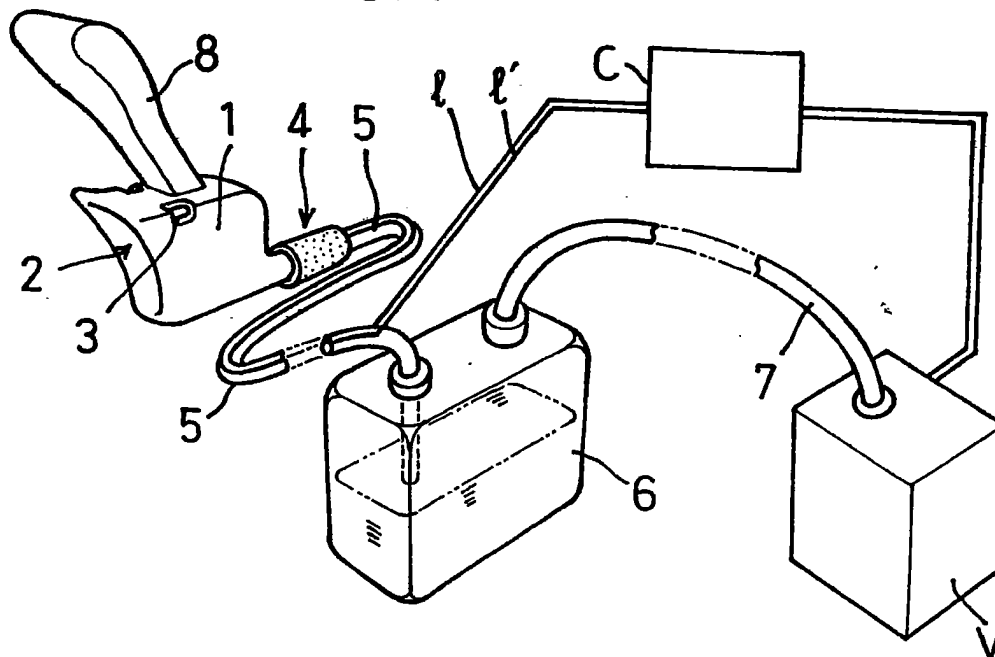
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(54) A vacuum suction type urinating  
aid

(57) A vacuum suction type urinating aid, including a urine receiver provided with a urine suction opening to be applied to a urinating region, an air suction hole separate from said urine suction opening, and a urine outlet, a urine transport tube connected, at one end, with said urine outlet and connected, at the other end, with a urine tank, and a vacuum suction tube communicating with a vacuum suction device and connected to the upper part of said urine tank, and including a fitting hole in said urine outlet, wherein said urine transport tube is formed integrally with control wires for controlling said vacuum suction device, outside the urine passage.

FIG. 1



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FIG. 1

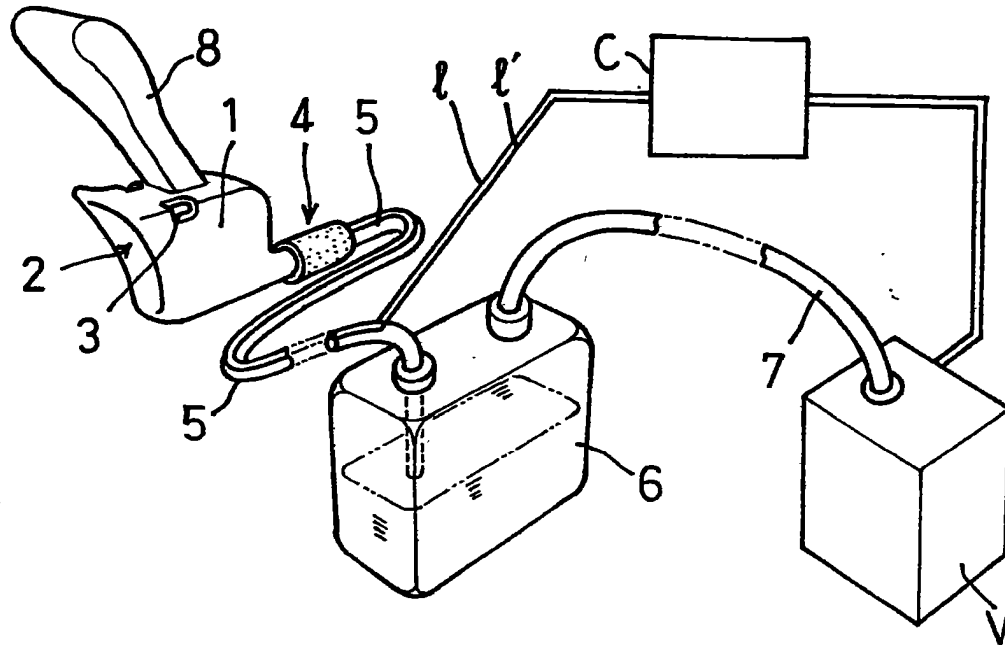


FIG. 2

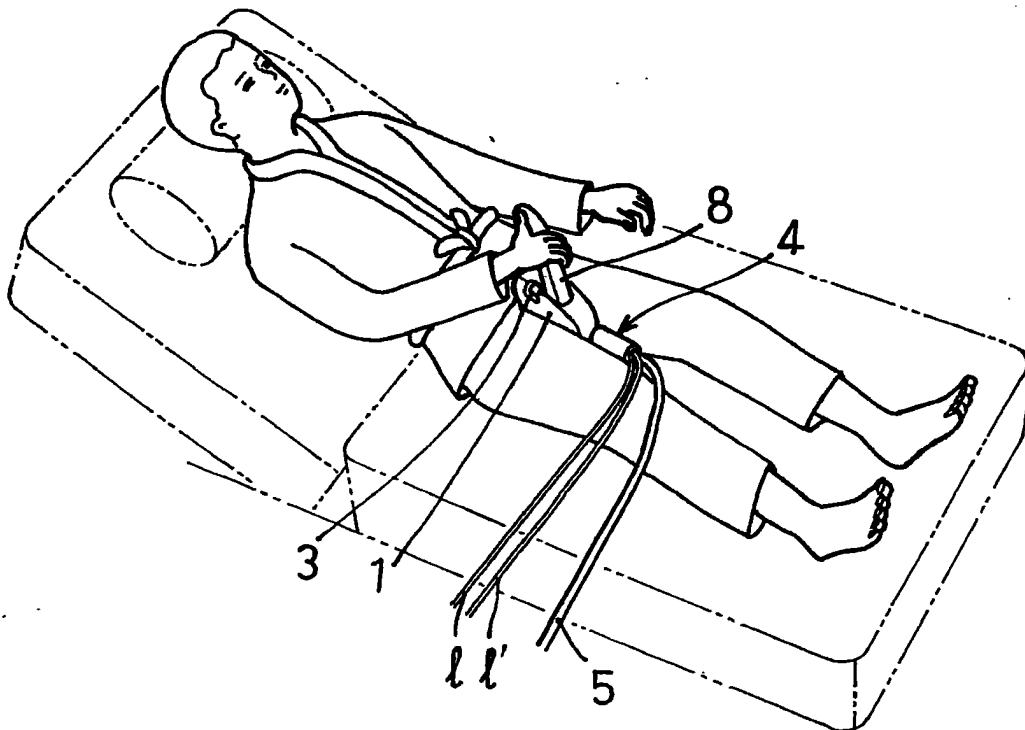


FIG. 3(a)

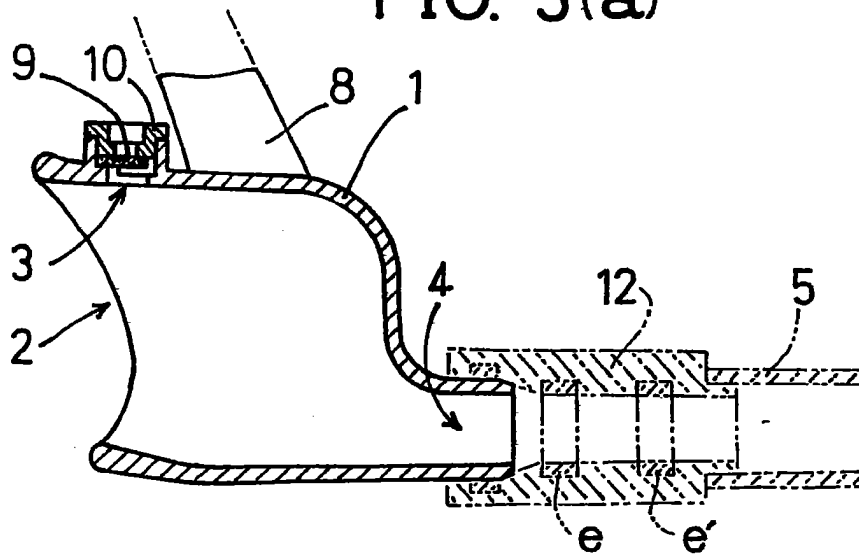


FIG. 3(b)

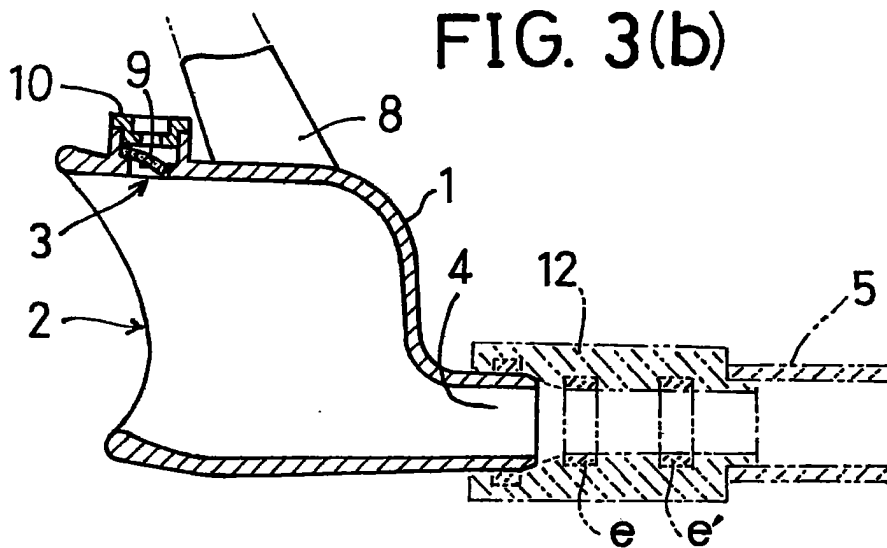


FIG. 4

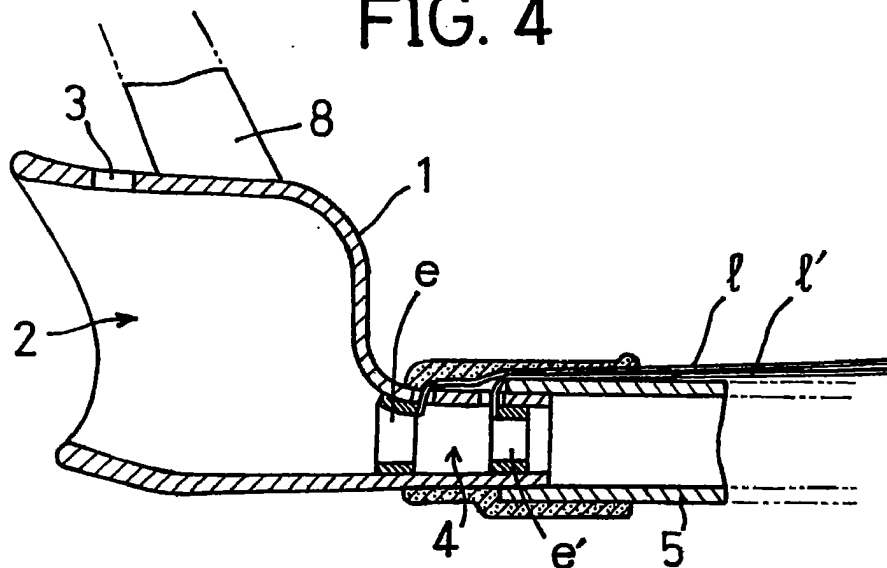


FIG. 5(a)

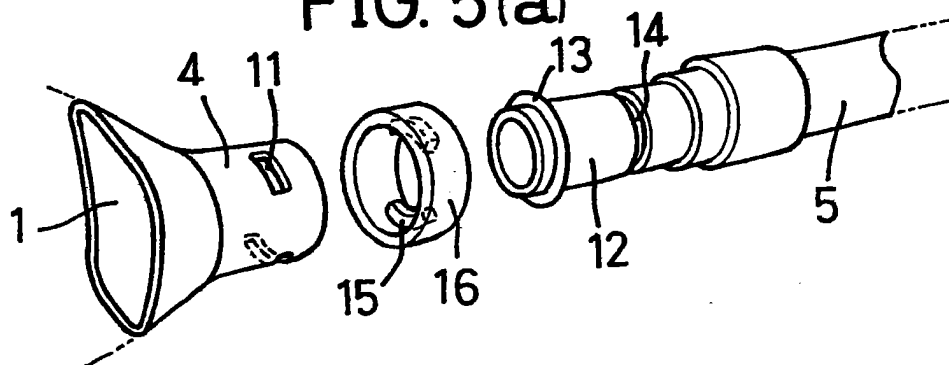


FIG. 5(b)

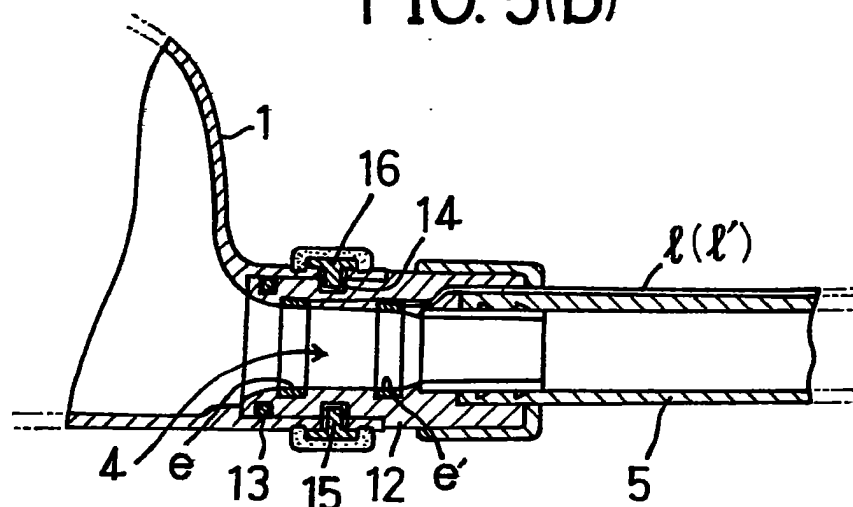


FIG. 6(a)

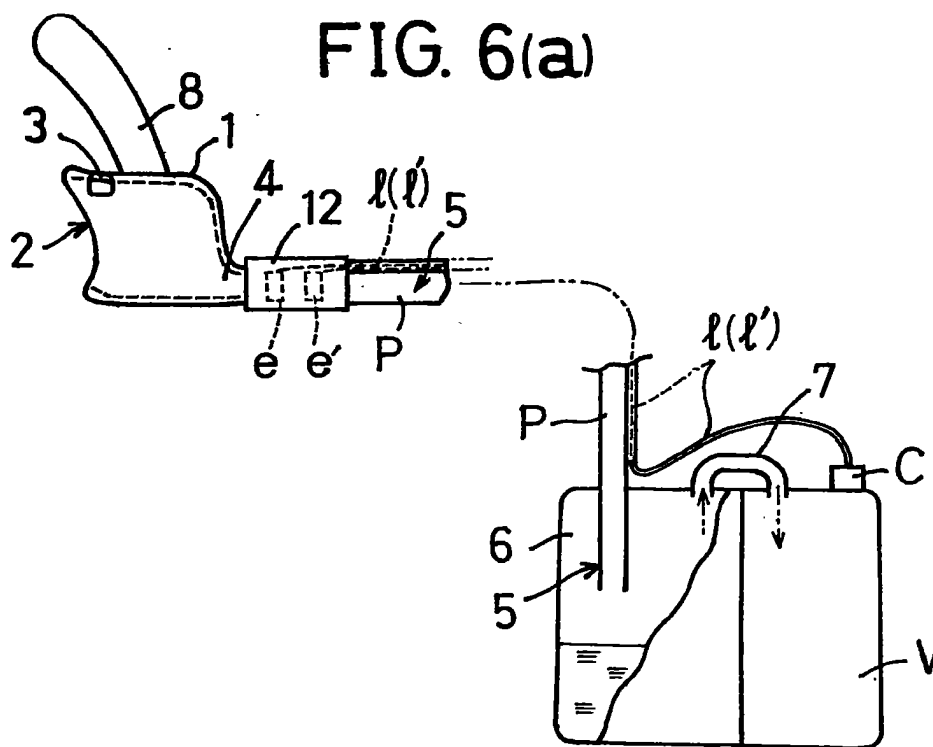


FIG. 6(b)

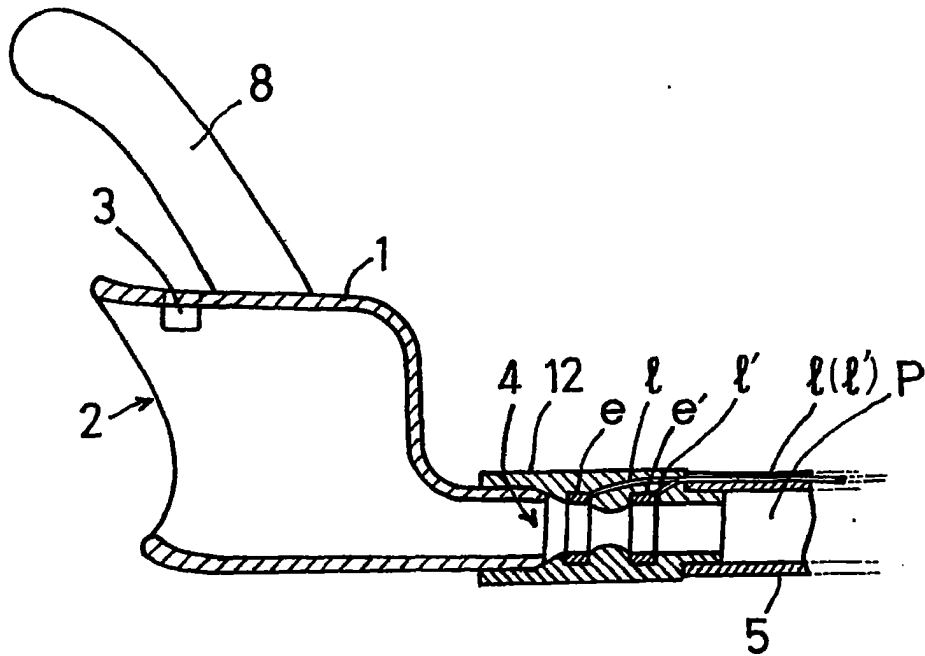


FIG. 7(a)

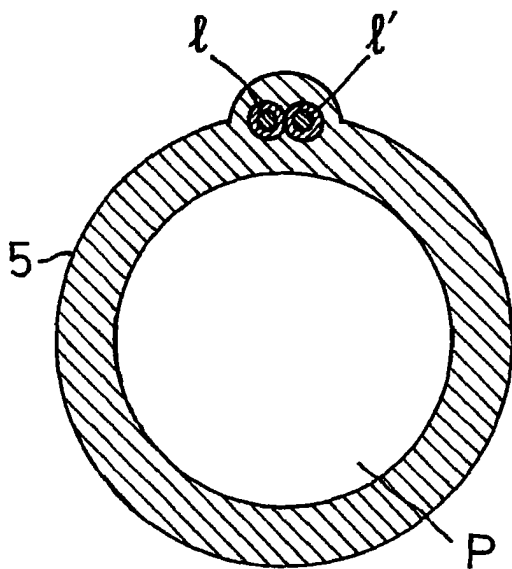


FIG. 7(b)

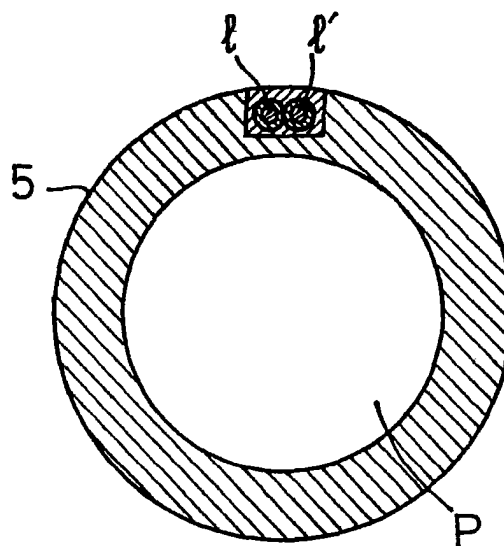


FIG. 8(a)

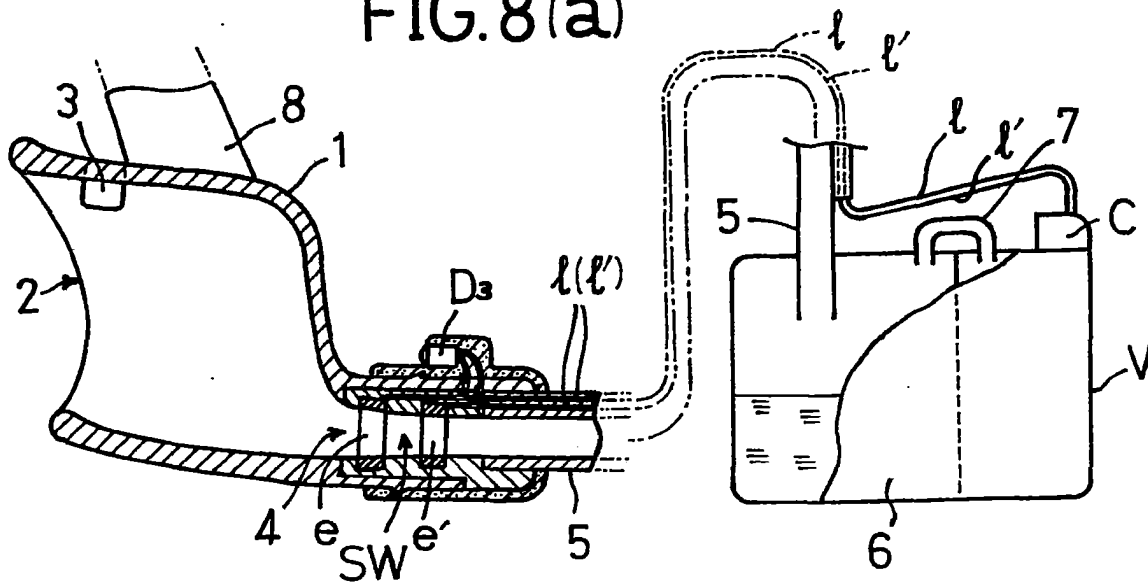


FIG. 8(b)

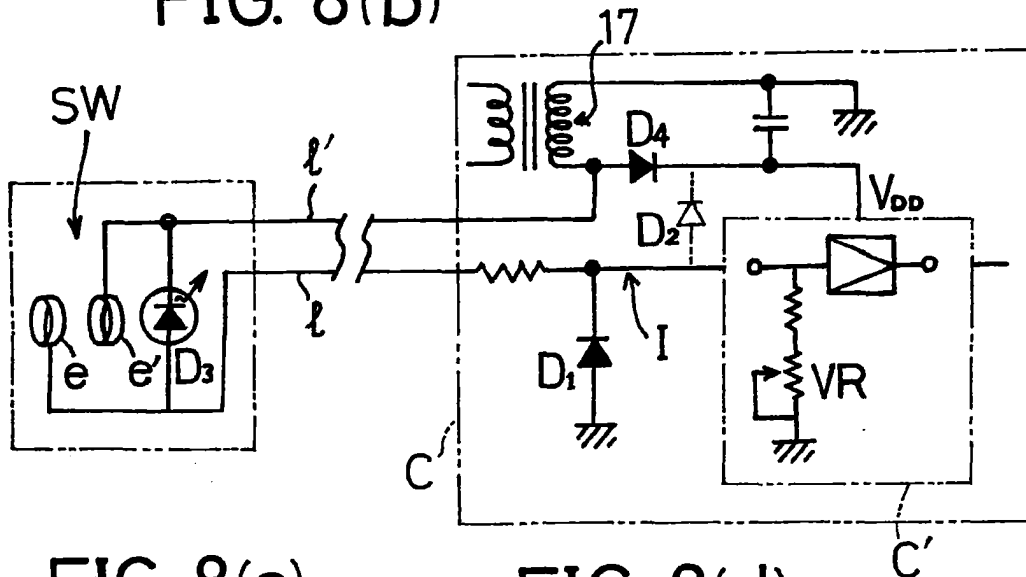
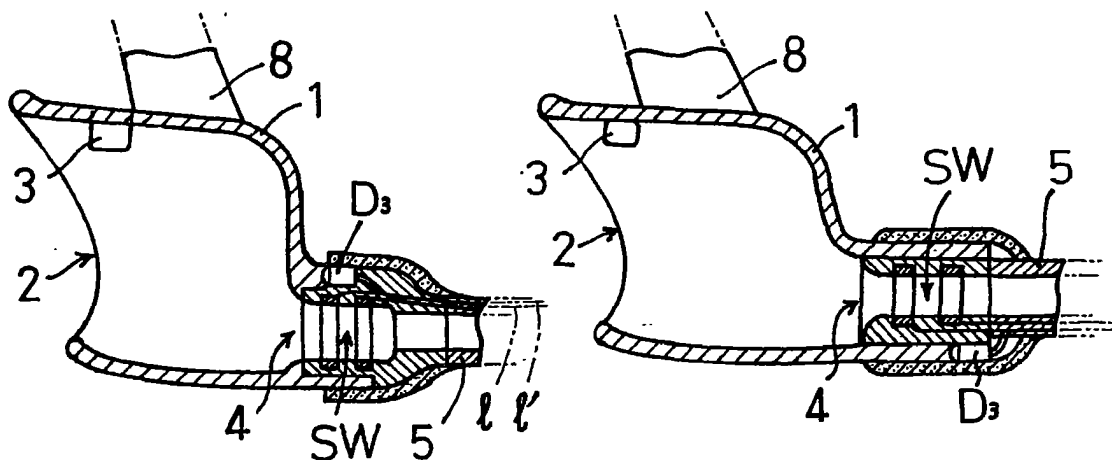


FIG. 8(c)

FIG. 8(d)



## SPECIFICATION

### A vacuum suction type urinating aid

5 The present invention relates to a vacuum suction type urinating aid.

There are people who must be assisted in urinating in bed. These people include the old lying in bed, seriously ill patients, patients suffering from the incontinence of urine, etc. who cannot control their urinating as soon as they feel a desire to urinate, and patients who cannot go to the toilet alone.

To attain the objective of assistance, an apparatus in which a receiver applied to the urinating region of the patient to receive his urine is connected with a tank to collect the urine through a tube has been used hitherto. However, with the conventional apparatus, the urine received by the receiver is dropped into said tank through said tube simply by gravity, and therefore the tube and the tank must be placed below said receiver, to permit urine to be dropped. For example, if the patient changes his position, causing the tube to be placed even partially above the receiver, the urine in the tube flows back into the receiver to soak the patient and bedclothes inconveniently. Such a conventional apparatus is disadvantageously restricted in the place of use and urinating pose.

According to the present invention, there is provided a vacuum suction type urinating aid, including a urine receiver provided with a urine suction opening to be applied to a urinating region, an air suction hole separate from said urine suction opening, and a urine outlet, a urine transport tube connected, at one end, with said urine outlet and connected, at the other end, with a urine tank, and a vacuum suction tube communicating with a vacuum suction device and connected to the upper part of said urine tank, and including a fitting hole in said urine outlet, wherein said urine transport tube is formed integrally with control wires for controlling said vacuum suction device, outside the urine passage.

The urinating aid of the present invention receives the urine of said patient, etc. in a urine receiver applied to his urinating region, and transports it to a urine tank through a urine transport tube forcedly together with air by vacuum suction, thereby overcoming the disadvantages of said conventional apparatus. In other words, even when said urine transport tube and said urine tank cannot be placed below said urine receiver, the present invention allows urine to be transported into the urine tank, without causing it to be flowed back.

In order that the invention may be more clearly understood, the following description is given by way of example only with reference to the accompanying drawings in which:

Figure 1 is an illustrative perspective view to show an embodiment of the general composition of the present invention. Figure 2 is an illustrative perspective view to show the state of use. Figure 3(a) & (b), 4 and 5 (a) & (b) are respectively illustrative longitudinal sectional views to show embodiments of the urine receiver. Figures 6(a) & (b) and 7(a) & (b) are respectively a general view, an illustrative longitudinal sectional view of a main portion and transverse

sectional view to show an embodiment of applying the urine transport tube formed solidly with the control wires. Figures 8(a), (b), (c) and (d) respectively an illustrative sectional view of the general system, a circuit illustration and illustrative sectional views of a main portion to show another embodiment.

In the drawings, symbol 1 is a urine receiver. Said urine receiver 1 is provided, at its front side, with a urine suction opening 2 to be applied to a urinating region and, at a proper place, with an air suction hole 3 separately from said urine suction opening 2, and further, at its rear side, with a urine outlet 4.

Furthermore in the vacuum suction type urinating aid of the present invention, the urine outlet 4 of said urine receiver 1 is connected to one end of a urine transport tube 5, and the other end of said urine transport tube 5 is connected to a urine tank 6, said urine tank 6 being connected, at its upper part, with a vacuum suction tube 7 communicating to a vacuum suction device V.

In this composition, when a patient feels a desire to urinate, he takes and operates a handle 8, to apply the urine suction opening 2 of the urine receiver 1 to his urinating region, and urinates into said urine receiver 1. Immediately before or after this action, a manual start switch (not illustrated) provided at a proper place such as the handle 8 is turned on, or for example, electric current flowing between a pair of electrodes e and e' provided in the passage of urine is detected through control wires l and l' by a control device C, to start said vacuum suction device V. Since vacuum pressure is applied to the urine outlet 4 of the urine receiver 1 through the vacuum suction tube 7, the urine tank 6 and the urine transport tube 5, air is sucked into the urine receiver 1 from said air suction hole 3 and the clearance between the urinating region and said urine suction opening 2. Therefore the urine discharged into the urine receiver through said urine suction opening 2 is sucked forcedly into the urine transport tube 5 from the urine outlet 4, together with and by the air sucked into the urine receiver 1 from said air suction hole 3 and the clearance between said urine suction opening 2 and the urinating region, and is transported through said urine transport tube 5 into the urine tank 6. In this case, since the vacuum suction tube 7 communicating to the vacuum suction device V is connected to the upper part of the urine tank 6, urine is not sucked into the vacuum suction tube 7, but is collected in the urine tank 6, being separated from air by gravity. Furthermore since the air suction hole 3 is formed separately from the urine suction opening 2, it prevents the urine suction opening 2 from adhering to the urinating region of the patient otherwise caused by the vacuum pressure, to improve the feeling of using the aid, and even if the urine suction opening 2 is in close contact with the urinating region without any clearance, the volume of air to carry urine with can always be secured by the air sucked from the air suction hole 3, as effects of air suction hole 3.

Thus, the present invention has a large feature that since the urine received by the urine receiver 2 is sucked forcedly together with air into the urine transport tube by the vacuum suction device V, to be transported into the urine tank 6, urine does not flow back even if the urine transport tube 5 and the urine tank 6 become higher than said urine receiver 1, and

therefore that the place of use and urinating pose are not restricted at all, as a urinating aid for serious patients, the old lying in bed and patients suffering from the incontinence of urine.

5 In addition to the above feature, the present invention has the following features in the compositions of the respective embodiments shown in the drawings.

10 In the embodiment shown in Figures 3(a) and (b), an air suction cap 10 equipped with a check valve 9 is mounted in said air suction hole 3. Said check valve 9 can be formed by an elastic sheet such as rubber sheet, and while it normally closes the air suction hole 3 by its own elasticity as shown in Figure 3 (a), it 15 leaves, at its one end, from the air suction cap 10 against its elasticity, to cause free suction of air as shown in Figure 3 (b), when vacuum pressure is applied to the urine receiver 1 from said urine outlet 4. In this composition, the air suction into the urine 20 receiver 1 from the air suction hole 3 is favourable, while the urine discharged from the urinating region cannot leak or scatter outside the urine receiver from the air suction hole 3 even if it directly hits said air suction hole 3, since it is prevented by the check valve 25 9. Therefore, even when a physically handicapped patient uses the aid and moves his body during urination, the leak and scattering of urine can be prevented perfectly as a feature of this embodiment.

In the embodiment shown in Figure 4, a pair of said 30 electrodes e and e' are placed at an interval inside said urine outlet 4, and control wires l and l' connected respectively to said electrodes e and e' are connected to the control device C of said vacuum suction device V. In this composition, when there exists urine at said 35 urine outlet 4, electric current flowing between said electrodes e and e' is detected by said control device C, and said vacuum suction device V is started by said control device C. The control device C can have any circuit configuration as far as it can detect such electric 40 current and start said vacuum suction device V. Also said electrodes e and e' can be freely composed, but if they are shaped like rings, urine passing at any portion in the urine outlet 4 can be detected, and even a small amount of urine can start the vacuum suction device V 45 perfectly. This embodiment has a feature that since the vacuum suction device V can be started automatically by detecting the existence of urine, the operation is simple, not causing any inconvenience of forgetting to turn on the switch or failing to turn on in time as in 50 case of using a manual switch, and enabling a patient himself to use easily. Said electrodes e and e' can be of course provided between the urine outlet 4 and the urine transport tube 5, as shown in another embodiment described later.

55 In the embodiment shown in Figures 5(a) and (b), a fitting hole 11 is formed at said urine outlet 4, and a sealing part 13 such as O ring is provided around a connection cylinder 12 at its end which can be freely inserted in said urine outlet 4, with a fitting groove 14 60 provided around said connection cylinder 12 at a position after said sealing part 13. An elastic collar 16 with a fitting protrusion 15 formed on the inside surface to suit said fitting hole 11 is put around said urine outlet 4, with said fitting protrusion 15 inserted 65 through said fitting hole 11 into said fitting groove 14

of said connection cylinder 12, and one end of said urine transport tube 5 is connected to said connection cylinder 12, so that one end of said urine transport tube 5 may be freely rotated against said urine outlet 4 70 through said connection cylinder 12 in their mutual connection, as a feature of this embodiment.

If the urine transport tube 5 cannot be rotated against the urine outlet 4 of the urine receiver, the urine transport tube 5 may be gradually twisted after 75 repeating the operation of the urine receiver for every time of urination. Such twisting of the urine transport tube 5 acts on the urine receiver 1. Therefore, a simple connection between the urine receiver 1 and the urine transport tube 5 makes it very inconvenient to operate 80 the urine receiver 1, and a powerless patient such as an old person lying in bed cannot apply the urine suction opening 2 to his urinating region properly. However, in this embodiment of the present invention, the urine receiver 1 and the urine transport tube 5 85 can be rotated relatively as mentioned above, and said twist of the urine transport tube 5 can be eliminated by the rotation of the connection cylinder 12 against the urine receiver 1 and is not transmitted to the urine receiver 1. Therefore, even a powerless patient can 90 apply the urine suction opening 2 to his urinating region properly and very easily, and even if he moves his body during urination, the position can be secured. In other words, this embodiment has a large feature that a patient using the urine receiver 1 can use it by 95 himself very easily in the optimum state, and in addition, a feature that the urine receiver can be kept easily by using a lifting hook, etc. when it is not used, since it is not affected by the twist of the urine transport tube 5. Since the connection cylinder 12 has 100 the sealing part 13 around it at its end, urine can never leak from the urine outlet 4.

The embodiment shown in Figures 6(a) & (b) and 7(a) & (b) is characterised in that the urine transport tube 5 connecting said urine outlet 4 with said urine 105 tank 6 is formed solidly with the control wires l and l' for controlling said vacuum suction device V, outside the urine passage P. Said urine passage P and the control wires l and l' are formed solidly, for example, by double forming, and the control wires can be 110 covered wires or bare wires. The control wires l and l' can be formed outside the urine passage P in the state of protrusion as shown in Figure 7(a), or in the state of no protrusion as shown in Figure 7(b). Said control wires l and l' are connected, at the ends of one side, to 115 the manual start switch (not illustrated) provided properly at the handle 8 of the urine receiver 1, etc., or to the electrodes e and e' provided at an interval inside the urine outlet 4 of the urine receiver 1, or inside the connection cylinder 12, etc., and are connected, at the 120 ends of the other side, to the control device C of the vacuum suction device V. Thus, in this embodiment of the present invention, the start signal generating portion for the vacuum suction device V, provided in or near the urine receiver 1 and the control device C of 125 the vacuum suction device V are connected by the control wires l and l' which are solidly formed outside the urine passage P. That is, since one urine transport tube 5 has both the functions of start signal passage and urine passage P, the urinating aid is easy to 130 handle and excellent in appearance, as a feature of the



embodiment. If the wires are formed by copper foil spiral winding, the twist of the urine transport tube by the control wires I and I' can be minimized.

The embodiment shown in Figures 8(a), (b), (c) and (d) is characterised in that a start switch SW provided at said urine receiver 1 is connected through one pair of the control lines I and I' provided along said urine transport tube 5 to the control device C of said vacuum suction device V; in the control device C, one of said control wires I and I' is connected to a grounded AC power source 17, while the other is connected to the input I of a switching circuit C', with an input diode D<sub>1</sub> connected between said input I and the grounding to make the grounding to make the grounding side positive; and in said urine receiver 1, a light emitting diode D<sub>3</sub> is connected to said control wires I and I' in parallel to said start switch SW so that the direction of the current by said input diode D<sub>1</sub> may be forward. In this case, the start switch SW can be a manual switch (not illustrated) provided at the handle 8 of the urine receiver 1, etc. as mentioned before, or anything which generates a switching signal by detecting the drop by urine, of resistance between a pair of, for example, ring-shaped electrodes e and e' provided in the urine passage, as illustrated. Said control wires I and I' can be wound spirally around said urine transport tube 5, or formed solidly around said urine transport tube 5 as mentioned before, or composed in any other proper way, as far as they are provided along said urine transport tube 5. Said control device C and the switching circuit C' can be composed freely, and for example, a diode D<sub>2</sub> for clipping input waveform, a variable resistor VR for sensitivity control, etc. can be arranged properly. In this composition, the operation of this embodiment is as described below. When there exists no urine between one pair of said electrodes e and e' in the urine passage or when the manual switch is not operated, AC negative half-cycle current flows in the circuit of the input diode D<sub>1</sub>, the control wire I the light emitting diode D<sub>3</sub>, the control wire I' and the AC power source 17, to cause the light emitting diode D<sub>3</sub> to light on. The AC positive half-cycle component is blocked by said light emitting diode D<sub>3</sub> and the input diode D<sub>1</sub>, and current does not flow in said circuit, and therefore since positive voltage is not applied to the input I, the switching circuit C' is not operated.

When a patient feels a desire to urinate, he applies the urine suction opening 2 of the urine receiver 1 to his urinating region, and urinates into said urine receiver. Immediately before or after this action, as mentioned before, the manual switch is turned on, or the urine wets the area between the electrodes e and e' of the urine passage, to decrease the resistance value, when the positive voltage of AC positive half-cycle component is applied from the AC power source 17, through the electrodes e and e' to the input I. If the positive voltage exceeds the threshold value of the switching circuit C', the switching circuit C' is operated. The operation of the switching circuit C' causes a timer relay or any other proper control circuit to be operated, to start the vacuum suction device V, and the urine discharged from said urine suction opening 2 into the urine receiver 1 is sucked forcibly into the urine transport tube 5 together with and by the air

sucked from the air suction hole 3 and the clearance between the urine suction opening 2 and the urinating region, and is transported into the urine tank 6, being separated from air, to be collected in said urine tank 6. Thus, even when the vacuum suction device V is operated, current of AC negative half-cycle component flows through the input diode D<sub>1</sub> to the light emitting diode D<sub>3</sub> as mentioned above, and therefore, the light emitting diode D<sub>3</sub> continues to always light on, irrespective of whether the vacuum suction device V is operated or not. Thus, in this embodiment, even when the urinating aid is used at night in a dark room, the position of the urine receiver 1 can be confirmed immediately by the light of the light emitting diode D<sub>3</sub>, and it is not necessary to grope for the urine receiver 1. A patient can use the urinating aid as soon as he feels a desire to urinate, and it cannot occur that he is not in time for urination because of darkness, allowing steady urination. Furthermore, the light emitting diode D<sub>3</sub> continues to light on even when the vacuum suction device V is operated, and therefore, the position of the urine receiver 1 can be confirmed during use, to permit urination in the optimum pose as an effect of this embodiment. Since the light emitting diode D<sub>3</sub> enables the position of the urine receiver 1 to be confirmed by its light, it can be set at any position as far as the position satisfies the objective. For example, said light emitting diode D<sub>3</sub> can be set at the position shown in Figure 8(a), to expose the light, or with the urine receiver 1 made of any material capable of transmitting light, the front edge of the urine receiver 1, etc. can be illuminated indirectly as shown in Figures (c) and (d), as a matter of course. The present invention has the effect as mentioned above, by setting the light emitting diode D<sub>3</sub> in the urine receiver 1, and the power to the light emitting diode D<sub>3</sub> is supplied by utilizing the control wires I and I' connecting the start switch of the urine receiver 1 with the control device C of the vacuum suction device V. Therefore, any additional wires for the light emitting diode are not required, to lower the cost and to simplify the composition, as a large feature.

As described above in detail, the vacuum suction type urinating aid of the present invention has a feature that even when the urine transport tube and the urine tank cannot be placed below the urine receiver, urine can be collected perfectly in the urine tank without causing the urine to flow back, and therefore that a patient, etc. can urinate, lying in bed, etc., with no restriction on the place of use or urinating pose, since the urine received by the urine receiver applied to the urinating region of the patient, etc. is transported forcibly together with air in the urine transport tube by vacuum suction to the urine tank. Thus, the present invention enables such people to urinate, using the aid in bed, when necessary, as the old lying in bed, serious patients, patients suffering from the incontinence of urine, etc. who cannot control their urination as soon as they feel a desire to urinate, and patients who cannot go to the toilet alone, irrespective of whether they live in private houses or hospitals. The quality of nursing for such patients can be thus improved remarkably.

Attention is drawn to our application No. 80 26793 from which the present application is divided and in

which is claimed a different invention embodied in the apparatus described herein.

#### CLAIMS

1. A vacuum suction type urinating aid, including a  
5 urine receiver provided with a urine suction opening to be applied to a urinating region, an air suction hole separate from said urine suction opening, and a urine outlet, a urine transport tube connected, at one end, with said urine outlet and connected, at the other end,  
10 with a urine tank, and a vacuum suction tube communicating with a vacuum suction device and connected to the upper part of said urine tank, and including a fitting hole in said urine outlet, wherein said urine transport tube is formed integrally with  
15 control wires for controlling said vacuum suction device, outside the urine passage.
2. A vacuum suction type urinating aid, according to claim 1, including a pair of spaced electrodes provided inside said urine outlet, said control wires  
20 being respectively connected to said electrodes and to a control device for said vacuum suction device, the control device being effective to start the vacuum suction device when urine is in said urine outlet between said electrodes.
- 25 3. A urinating aid according to claim 2, wherein said electrodes are ring-shaped.
4. A urinating aid according to any preceding claim including a start switch provided at said urine receiver and connected through the pair of control  
30 wires provided along said urine transport tube to a control device for said vacuum suction device, one of said control wires being connected to a grounded AC power source and the other being connected to the input of a switching circuit, an input diode connected  
35 between said input and the grounding to make the grounding side positive and, in said urine receiver, a light emitting diode connected to said control wires in parallel with said start switch.

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